

# ***VSANS Instrument Overview***

June, 4<sup>th</sup>, 2012

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NIST Center for Neutron Research



# VSANS Instrument

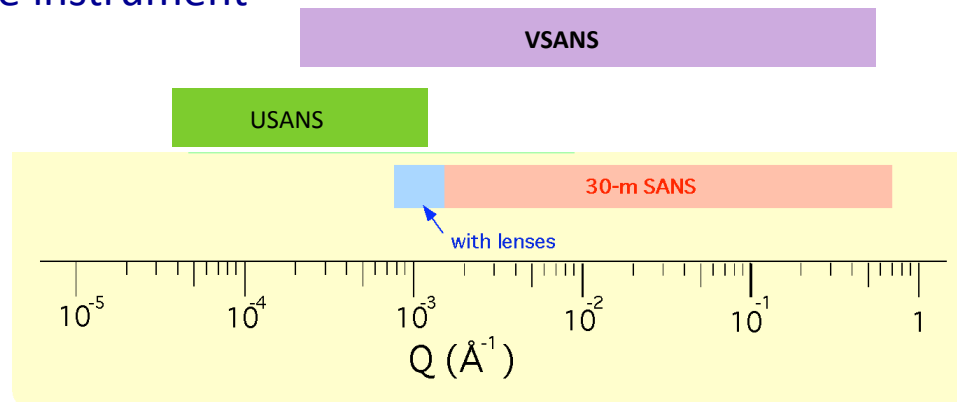
## ● *Outline*

- *Instrument Description*
- *Instrument Layout*
- *Completed Milestones*
- *Future Milestones*
- *Revised Schedule*
- *Revised Budget*

# VSANS Instrument

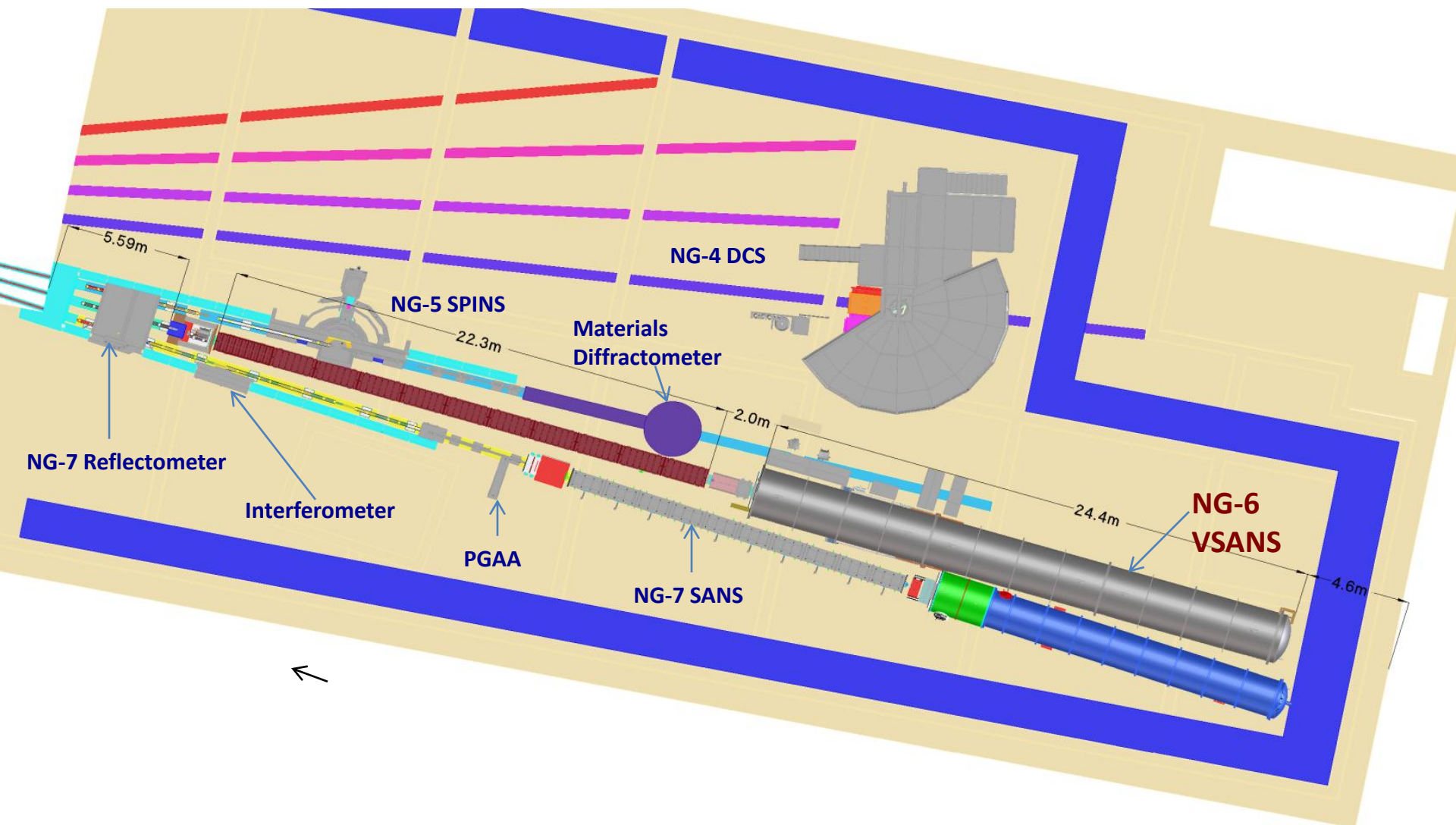
## Why VSANS ?

- To improve measurement efficiency
  - extending the q-range of the 30 m SANS instruments would enable most SANS experiments to be completed on one instrument

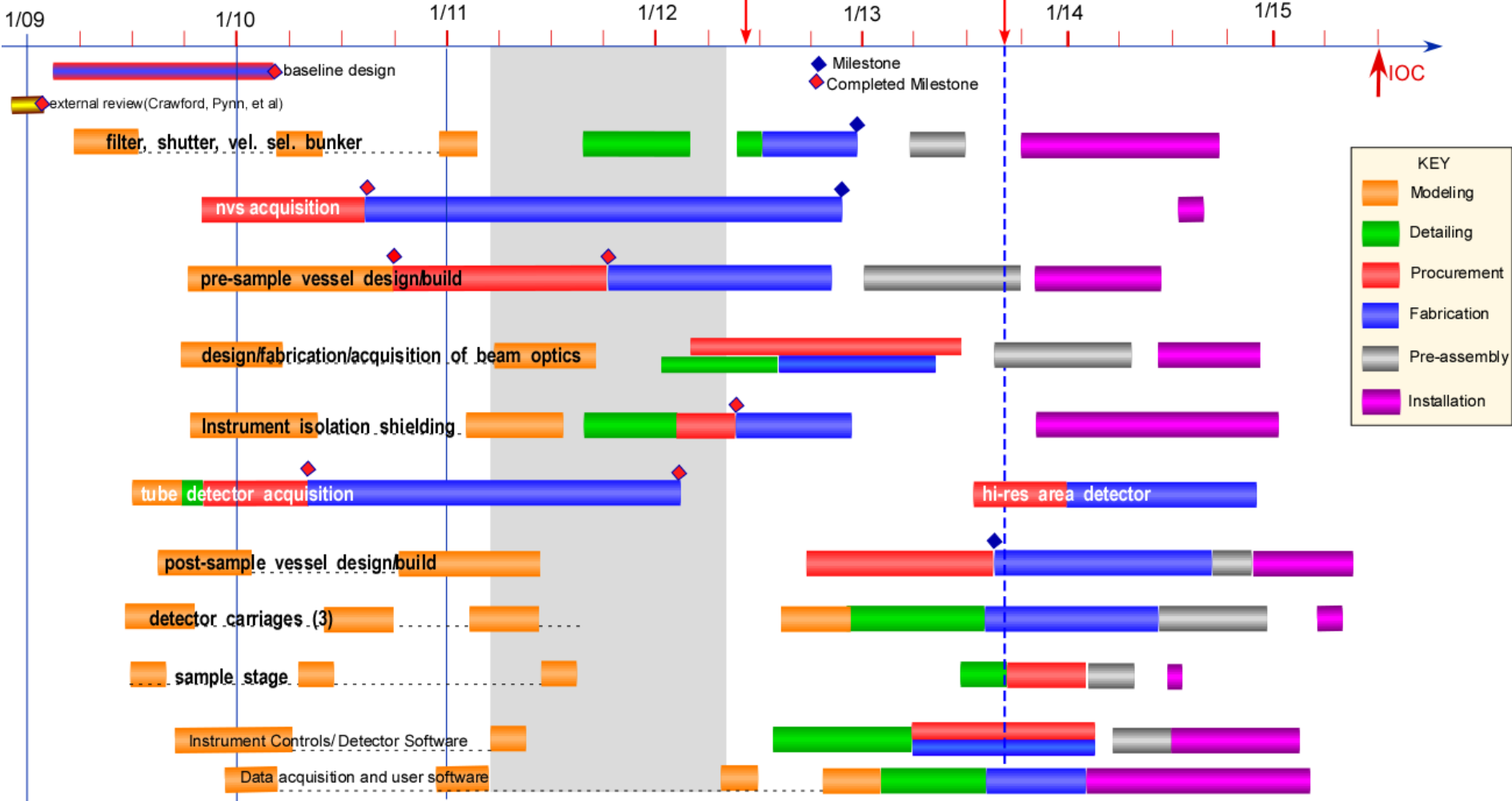


- To add new measurement capabilities
  - 2% or 13.5 % or white Beam wavelength band
  - expandable sample staging area
  - multiple detectors to extend q-range of a single measurement

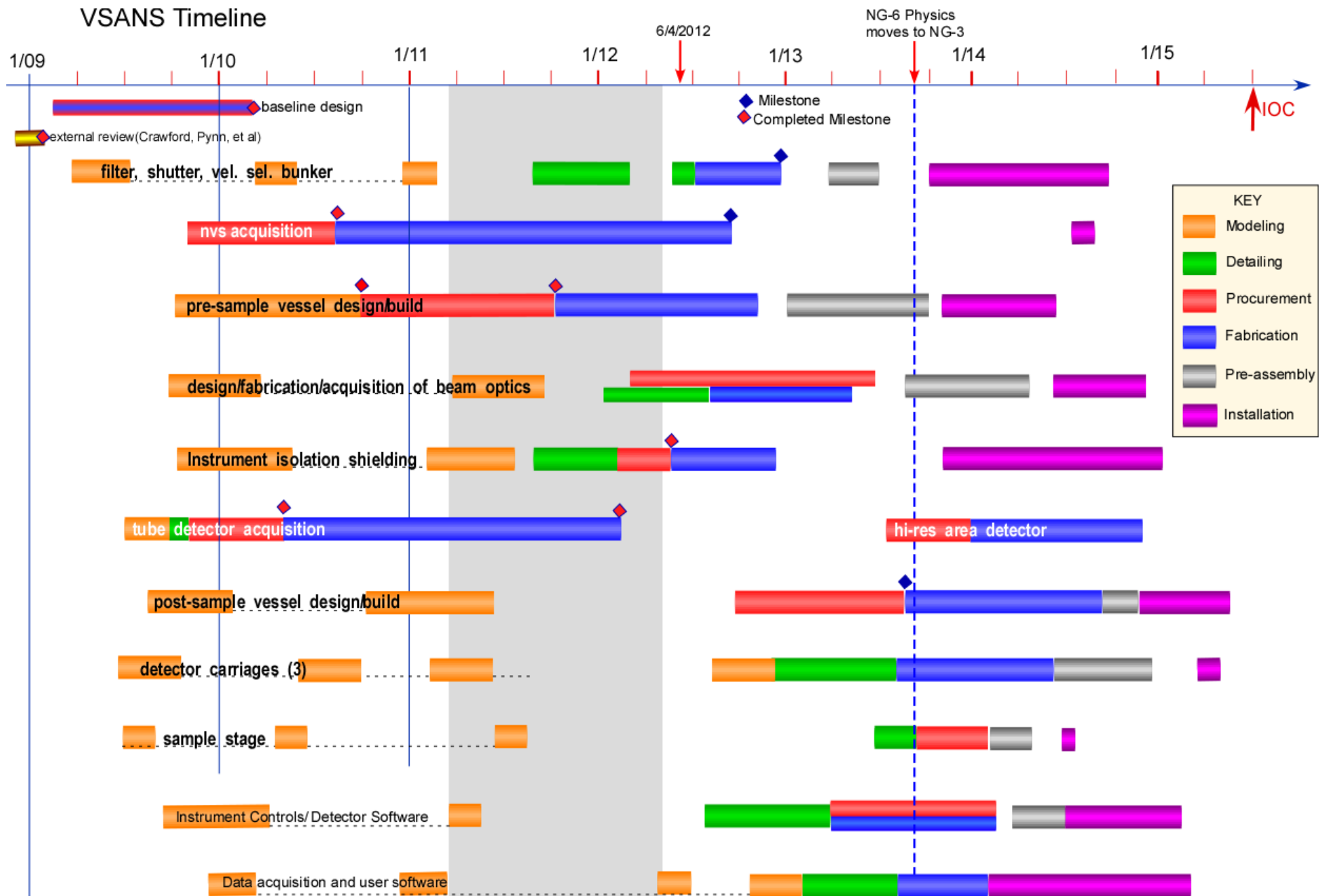
# Plan View of VSANS Instrument in Guidehall



# VSANS Timeline



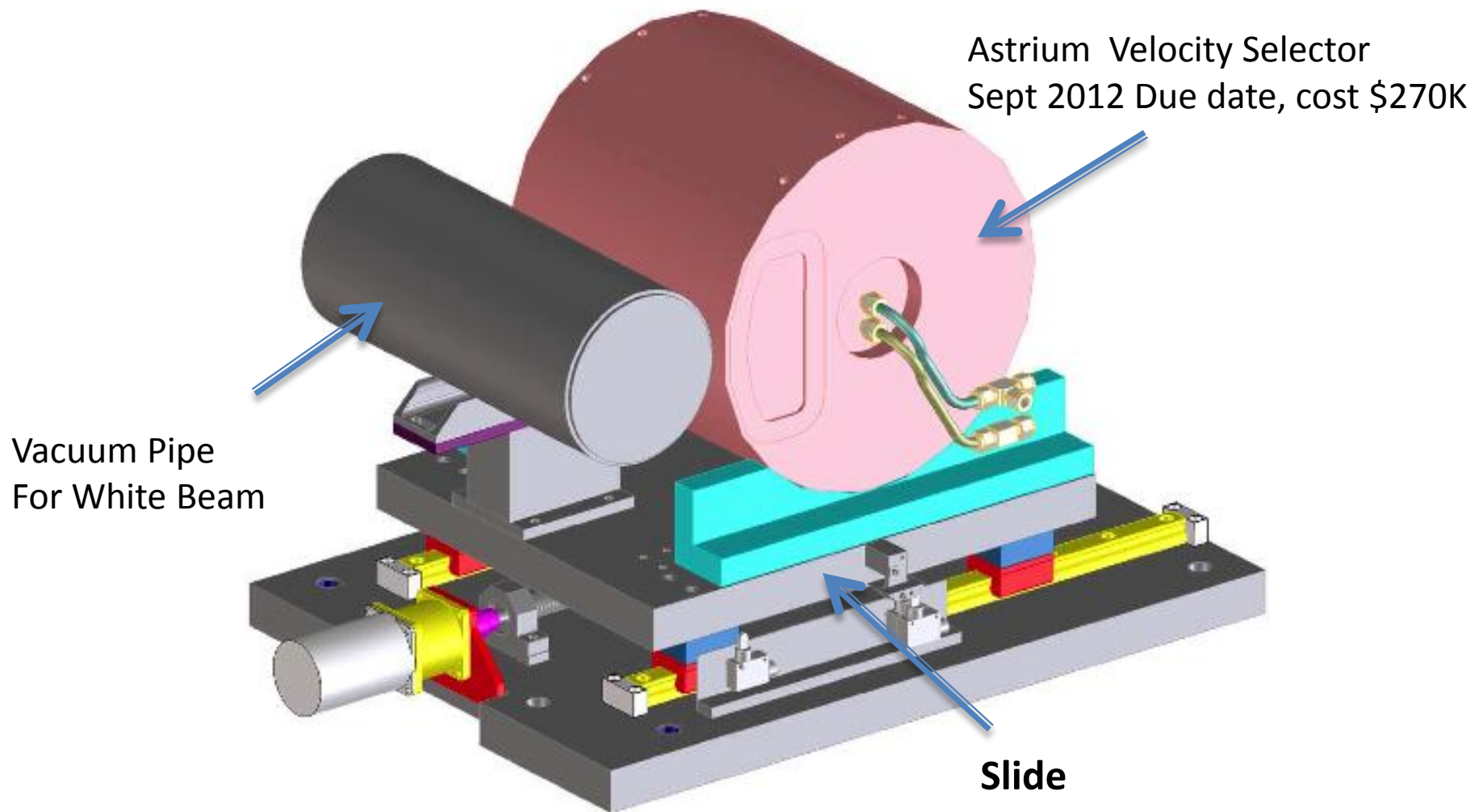
# VSANS Timeline



# Completed Milestones

- Baseline design approved Feb-2010
- **Velocity Selector contract** Sep-2010
- Pre-sample vacuum vessel fixed price contract Aug-2011
- Detailed design of velocity selector bunker Mar-2012
- Detailed design of instrument isolation shielding Feb-2012
- Delivery of detector tubes (~400) for main detectors Feb-2012
- Polarizing guide contract Apr-2012





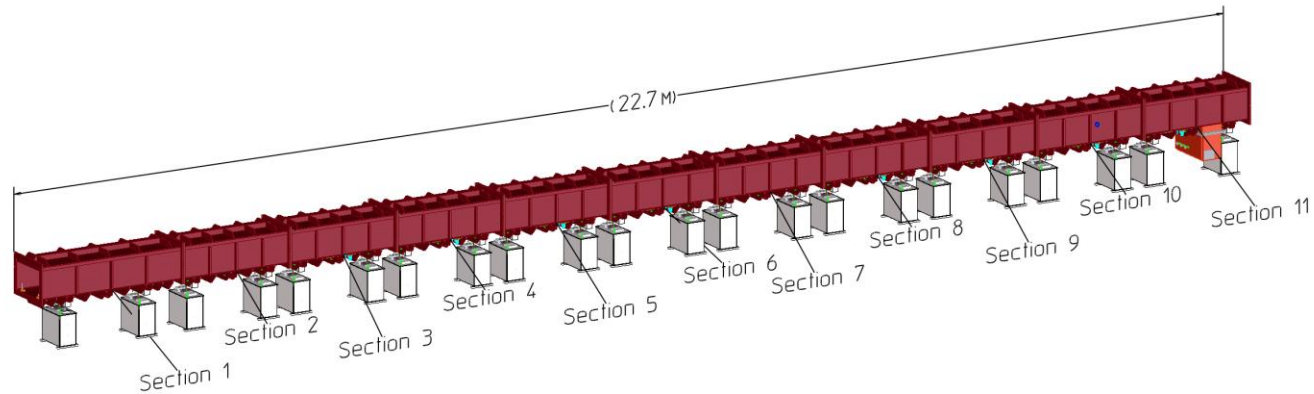


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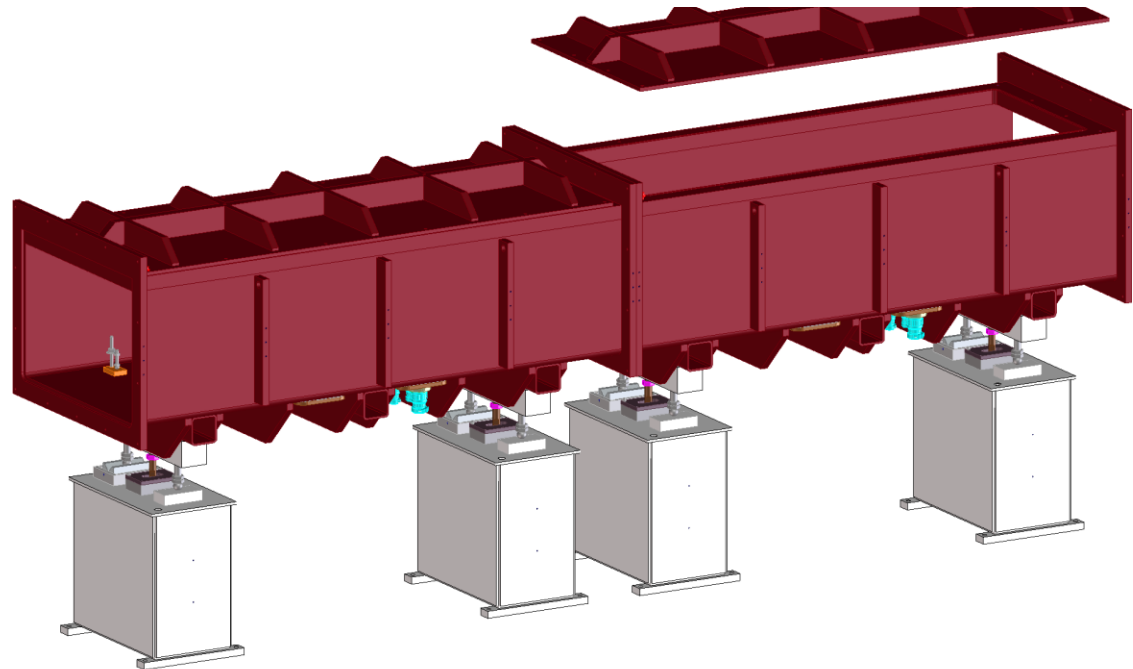


# *Pre-Sample Vessel*



## **2) Presample Vessel:**

- Delivery: November, 2012
- Cost: \$722K { FY 2011 }



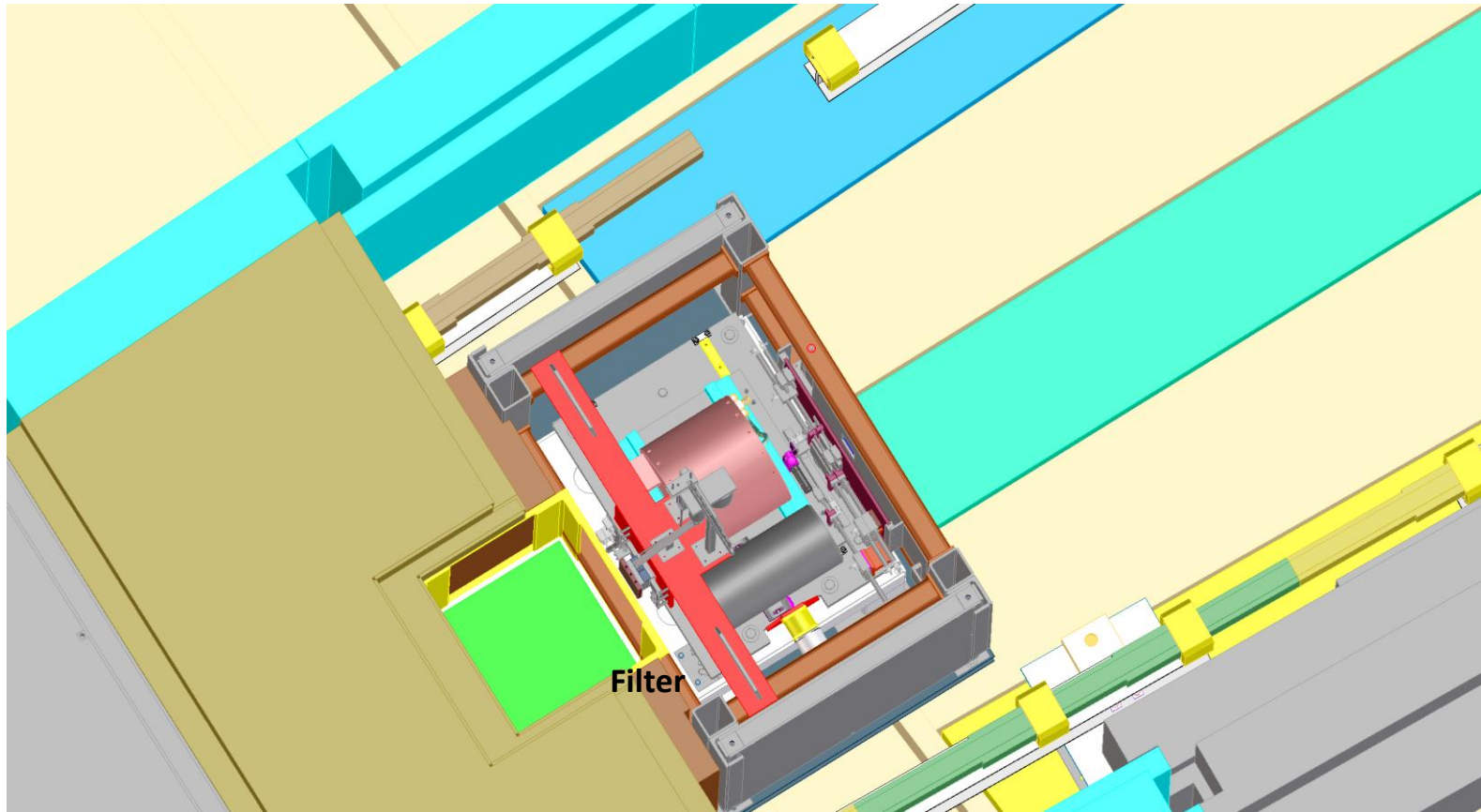
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### 1) Filter + Velocity Selector Bunker Status:

- Ready for fabrication 2012
- Shielding + ancillary equipment Budget: \$25K { FY 2012 }

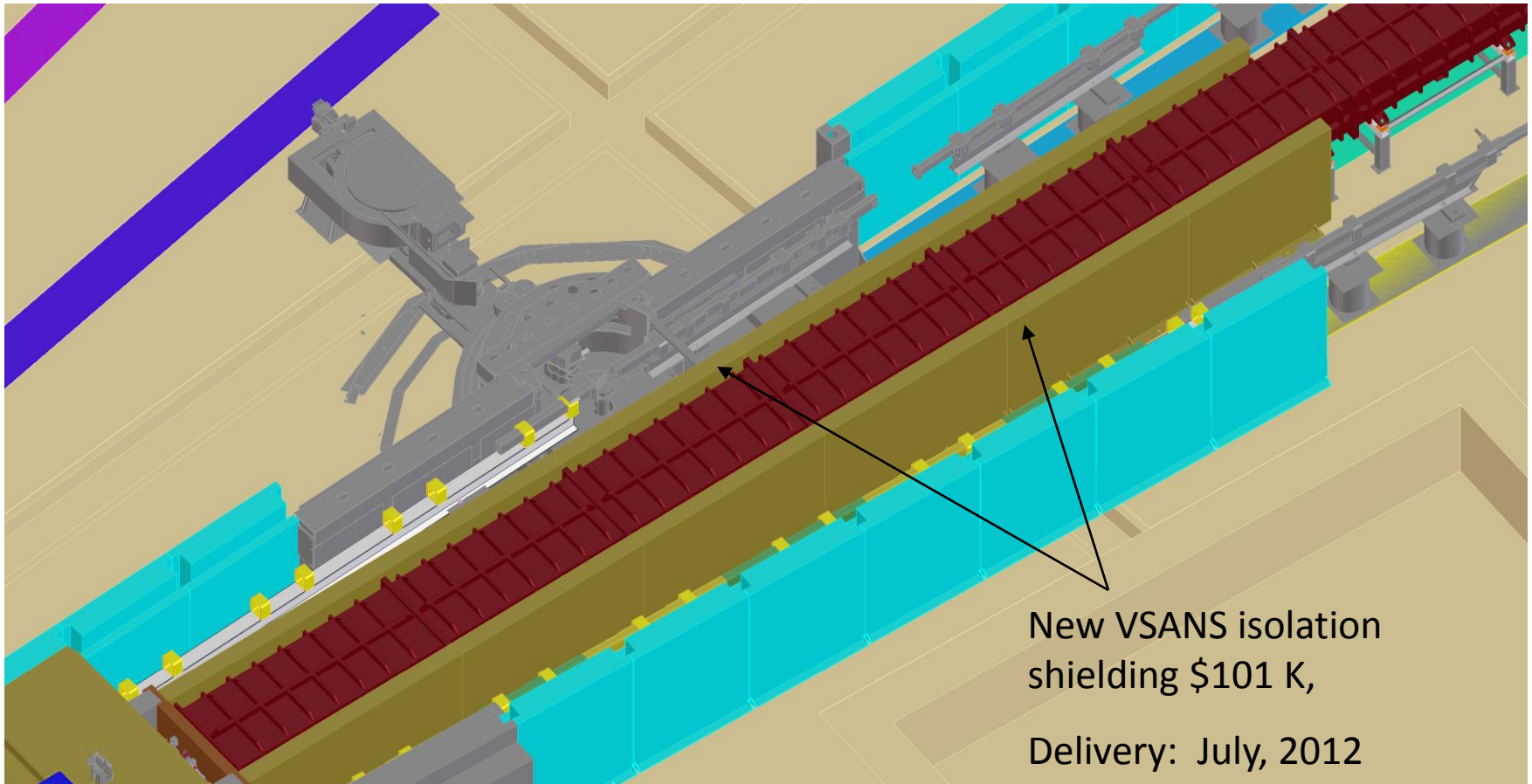


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Addition of Isolation Shields Between Guides NG5, NG6 and NG7  
To allow maintenance on mechanical systems with NG5 and NG7 operational

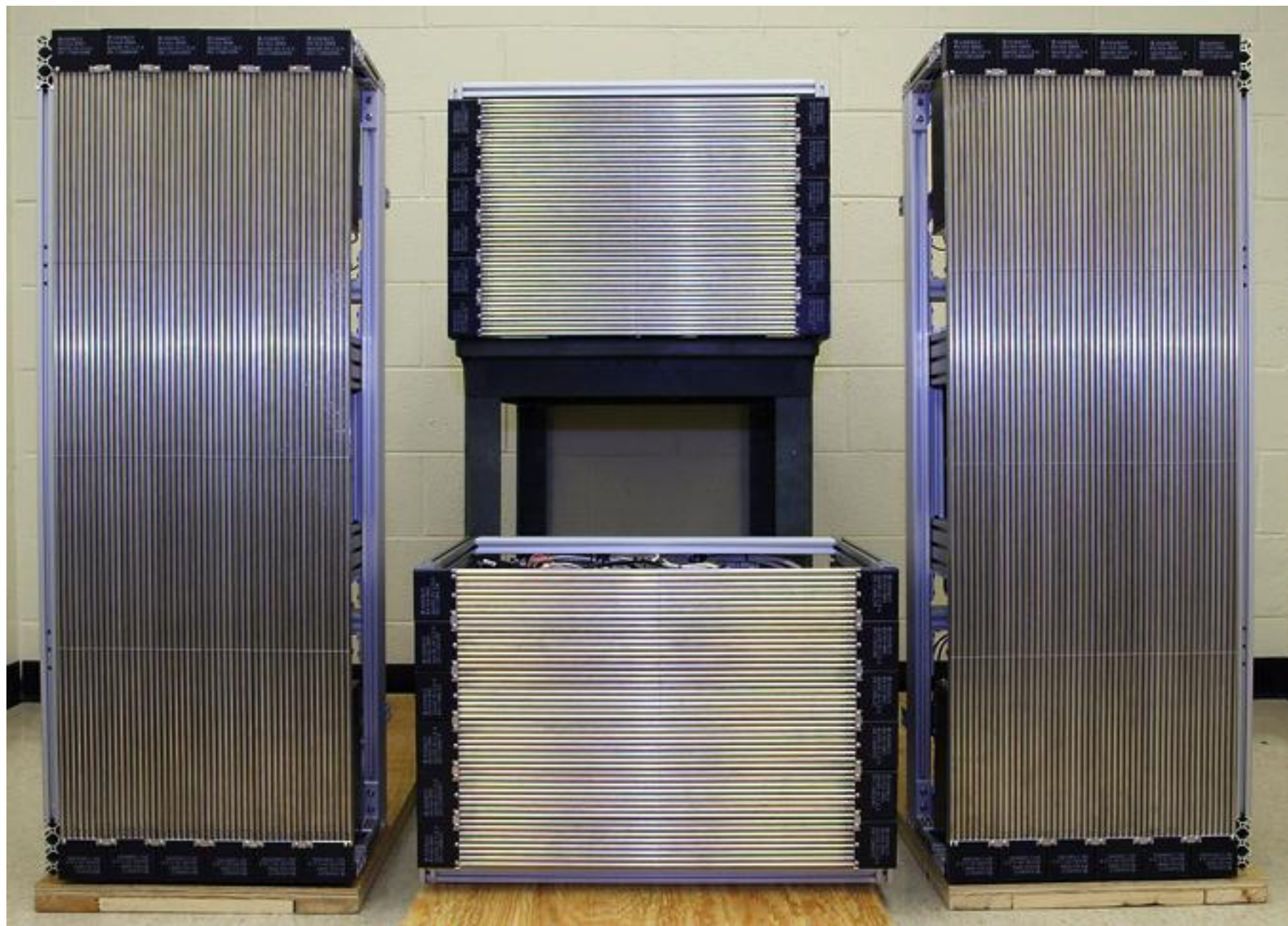


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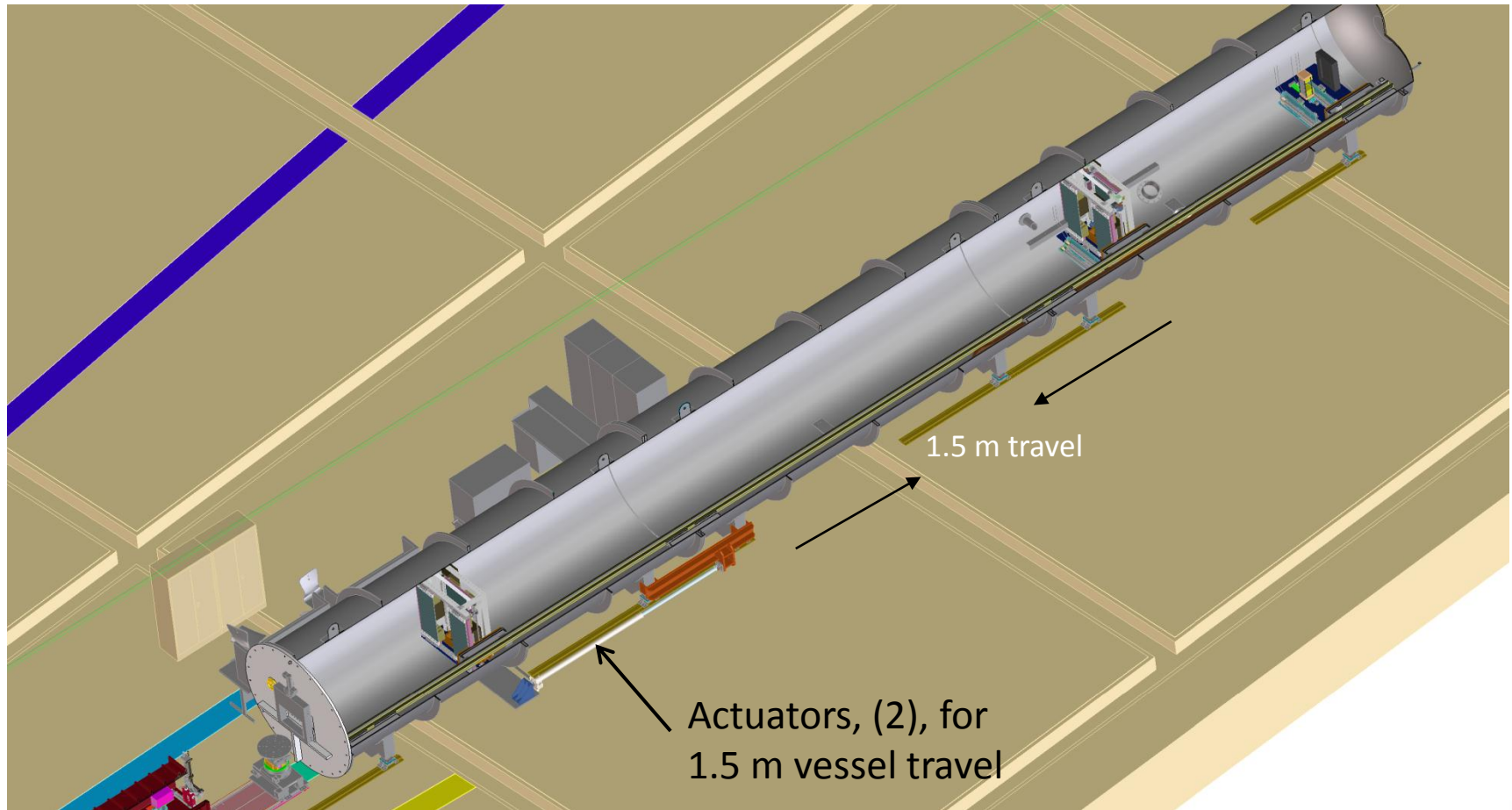
# Future Milestones

- Assemble pre-sample components Off-line Jan-2013 to Sep-2013
- Remove NG-6 Guide Sep-2013
- Install Pre-sample Bunker, Vessel + Components Oct-2013 May-2014  
{ Extended work within NG-5,6,7 bunker only during reactor shutdowns }
- Install Post-sample Vessel + Components Jun-2014 to Oct-2014  
{ Installed + tested as components arrive from vendors... }
- Sample Area Installation Nov-2014 to Dec-2014  
{ Installed + tested as components arrive from vendors... }
- Final Instrument testing → **IOC** **June-2015**

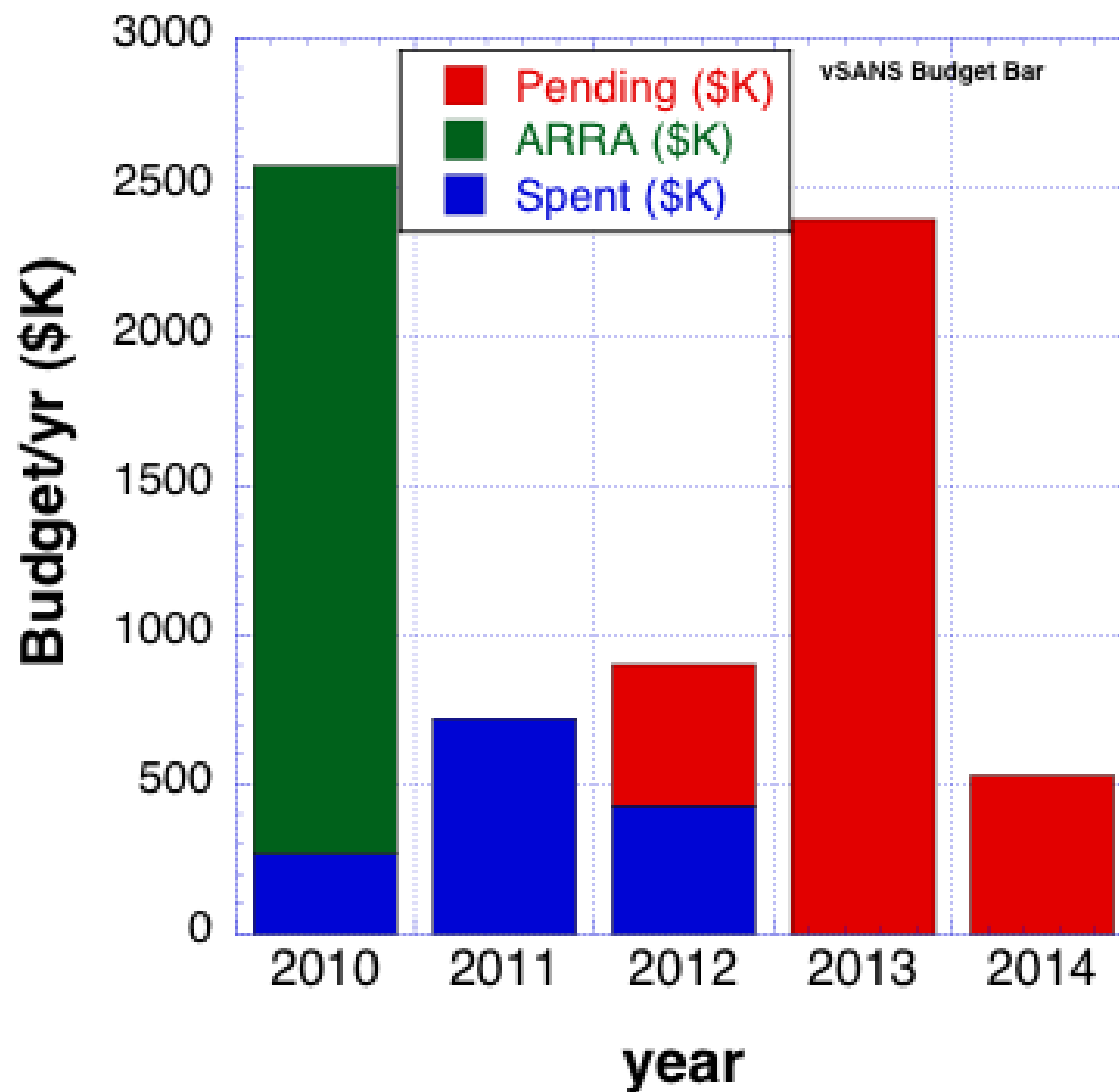


Cutaway view of detector vessel showing three movable detector carriages

Procurement: Vessel + carriages 2013, Hi-Res Back Detector 2014



## Yearly Budget Expenditure w/o Labor



## VSANS Budget Summary

Revised: 25-May-12

### WBS Tasks

2 Pre-Sample and Post-Sample Vessels									
Pre-Sample Vessel Design/Build Contract				\$350,000		\$722,000	\$722,000	\$722,000	Nov-2012
Post-Sample Vessel Fabrication				\$500,000		\$500,000	\$800,000		procure '13
Gate Valves (2)				\$30,000		\$40,000	\$40,000		procure '13
Pumps and gauges				\$20,000		\$60,000	\$136,800		procure '13
Cadmium lining				\$60,000		\$225,000	\$225,000		procure '13
			Subtotal	\$960,000		\$1,547,000	\$1,923,800	\$722,000	
3 Beam Filter Relocation									
Fabricate shielding weldments				\$40,000		\$40,000	\$40,000		procure '12
Shot & Wax for shields				\$5,000		\$5,000	\$5,000		procure '12
			Subtotal	\$45,000		\$45,000	\$45,000	\$0	
4 Shutter, Velocity Selectors & Shielding									
Velocity Selector				\$325,000		\$270,000	\$270,000	\$270,000	~Oct-2012
Fabricate shielding weldments				\$80,000		\$40,000	\$40,000		procure '12
Lead shielding				\$15,000		\$6,000	\$6,000		procure '12
Shot & Wax				\$10,000		\$10,000	\$10,000		procure '12
Beam monitors (1 @ \$4k ea)				\$8,000		\$8,000	\$8,000	\$3,500	Sep-2012
Machined parts (shutter & attenuator fixtures)				\$20,000		\$35,000	\$35,000		procure '12
Purchased parts (translation stages, actuators, fasteners,etc.)				\$20,000		\$20,000	\$20,000		procure '12
			Subtotal	\$478,000		\$389,000	\$389,000	\$273,500	

WBS Tasks		02-Mar-2011	30-Sep-2011	25-May-12	Actual	Delivery
<b>5 Beam Optics inside pre-sample vessel</b>						
Neutron guide sections (~20 m @ \$12k/m)		\$240,000	\$240,000	\$174,000	\$174,000	April 2, 2013
ZYA pyrolytic graphite for monochromator		\$60,000	\$60,000	\$60,000		procure '13
Rotary table for monochromator		\$5,000	\$5,000	\$5,000		procure '13
Polarizing guide		\$125,000	\$80,000	\$146,000	\$146,000	Nov 22, 2013
Linear translation stages (60 @ \$2k ea.)		\$120,000	\$125,000	\$125,000		procure '13
XY high precision translation stages (2 @ \$20k ea)		\$60,000	\$66,000	\$66,000		procure '12
Gradient RF Spin Flipper & power supply		\$40,000	\$40,000	\$11,000		procure '13
Alignment laser, expander & mount		\$2,000	\$2,000	\$2,000		procure '13
Refractive lenses (200 @ \$150 ea.)		\$22,500	\$22,500	\$27,600		procure '13
Gravity cancelation prisms (56 @ \$300 ea.)		\$9,000	\$9,000	\$45,600		procure '13
Cryo-cooler for lenses and prisms		\$25,000	\$25,000	\$25,000		procure '14
guide field magnets		\$10,000	\$10,000	\$5,430	\$5,430	July, 2012
guide field machined parts		\$0	\$70,000	\$70,000		procure '13
vacuum feedthroughs		\$30,500	\$0	\$0		procure '13
pre-sample cabling and vacuum feedthrus		\$0	\$48,000	\$48,000		procure '13
internal machined parts		\$140,000	\$140,000	\$140,000		procure '13
	Subtotal	\$889,000	\$942,500	\$950,630	\$325,430	
<b>6 Sample Stage</b>						
Rotary table		\$40,000	\$40,000	\$40,000		procure '14
X heavy-duty translation stage		\$15,000	\$15,000	\$15,000		procure '14
Y heavy-duty translation stage		\$15,000	\$15,000	\$15,000		procure '14
Z heavy-duty translation stage		\$50,000	\$50,000	\$50,000		procure '14
Aperture translation stage		\$5,000	\$5,000	\$5,000		procure '14
Sample tilt stage		\$6,000	\$6,000	\$6,000		procure '14
Sapphire and silicon beam windows		\$26,000	\$26,000	\$26,000		procure '14
Welded support structure		\$30,000	\$30,000	\$30,000		procure '14
Machined parts		\$25,000	\$25,000	\$25,000		procure '14
Ti Demountable Sample Cells				\$20,000		procure '14
Cooling+Heating Blocks				\$8,000		procure '14
Silicone Oil Bath				\$21,000		procure '14
	Subtotal	\$212,000	\$212,000	\$261,000	\$0	

WBS Tasks			02-Mar-2011	30-Sep-2011	25-May-12	Actual	Delivery
<b>7 Detector Vessel Internal Components</b>							
<b>Detectors and associated electronics</b>							
	2D high resolution position-sensitive detector (PSD)		\$220,000	\$220,000	\$220,000		procure '14
	1D high resolution PSD		\$100,000	\$0	\$0		
	PSD tubes (~384) and electronics		\$2,340,000	\$2,340,000	\$2,340,000	\$2,340,000	Feb-2012
<b>Detector Carriages (3)</b>							
	Purchased parts						
	Cable carriers		\$12,000	\$12,000	\$12,000		procure '13
	Rails, motors, encoders, limit switches, etc.		\$30,000	\$30,000	\$30,000		procure '13
	Forced air cooling		\$5,000	\$5,000	\$5,000		procure '13
	Linear translation stages for tube detector banks		\$14,000	\$14,000	\$14,000		procure '13
	Vacuum feedthroughs		\$10,000	\$10,000	\$10,000		procure '13
	Machined parts						
	Carriage platforms and detector supports		\$60,000	\$150,000	\$150,000		procure '13
	Electronics enclosures		\$25,000	\$25,000	\$25,000		procure '13
<b>Beamstops and positioning mechanisms (2 sets)</b>							
	Purchased parts		\$15,000	\$15,000	\$15,000		procure '13
	Machined parts		\$15,000	\$15,000	\$15,000		procure '13
		Subtotal	\$2,846,000	\$2,836,000	\$2,836,000	\$2,340,000	

WBS Tasks			02-Mar-2011	30-Sep-2011	25-May-12	Actual	Delivery
<b>8 Instrument Control Systems</b>							
Purchased parts							
	VME chassis and computer (2) @\$8200.		\$16,400	\$16,400	\$16,400		procure '13
	Stepping motor indexers, drivers, power supplies and crates		\$67,000	\$67,000	\$67,000		procure '13
	Sample equipment interfaces (GPIB, RS-232, USB, ethernet, etc.		\$15,000	\$15,000	\$15,000		procure '13
	Cabling and connectors		\$170,000	\$170,000	\$170,000		procure '13
	Scalers and ratemeters		\$8,000	\$8,000	\$8,000		procure '13
	Shutter controls		\$5,000	\$5,000	\$5,000		procure '13
	Vacuum system controls & interlocks		\$8,000	\$8,000	\$8,000		procure '13
	Detector integration & position decoding electronics		\$10,000	\$10,000	\$10,000		procure '13
	Time and Position histogramming memory and controller		\$15,000	\$15,000	\$15,000		procure '13
Machined parts							
	Enclosures, feedthroughs, mounting fixtures, etc.		\$15,000	\$15,000	\$15,000		procure '13
		Subtotal	\$329,400	\$329,400	\$329,400	\$0	
<b>9 Data Acquisition Computers &amp; Software</b>							
	computers, terminals & printers		\$15,000	\$15,000	\$15,000		procure '14
	commercial software		\$10,000	\$10,000	\$10,000		procure '14
		Subtotal	\$25,000	\$25,000	\$25,000	\$0	
<b>10 Modifications to Guide Shielding and NG-7 SANS</b>							
	modifications to shielding for NG-5,6 and 7		\$500,000	\$350,000	\$350,000		procure '12
	Isolation wall shields					\$100,644	July, 2012
	Roof Shields						procure '12
	mods to shift NG-7 SANS detector tank 30 cm East		\$50,000	\$50,000	\$50,000		procure '13
		Subtotal	\$550,000	\$400,000	\$400,000	\$100,644	
		Total	\$6,159,580	\$6,725,900	\$7,159,830	\$3,761,574	



### Outstanding Issues / Risks:

- Long lead time for hi-res detector but procurement not until 2014

#### **Meetings in 2013 to develop best strategy/options**

- IOC date sensitive to budget profile

**Delay procurement of items that will allow limited initial IOC capabilities or delay IOC.**

- Installation schedule sensitive to other RFO activities, particularly instrument moves. (NG-6 Physics + NSE)

- 1) Continue RFO Expansion meetings → revisions in schedule.**
- 2) institute biweekly RFO meetings on vSANS in 2013.**

